

Ranges of Temperature at Signal Service Stations.—The monthly ranges will appear from the *maxima* and *minima* just given. The greatest *daily ranges* vary in New England, from 15° at Block Island to 21° at Eastport and 31° at Burlington; Middle Atlantic States, 16° at Cape May to 26° at Albany and 32° at Lynchburg; South Atlantic States, 10° at Portsmouth to 29° at Augusta; East Gulf States, 15° at Key West to 26° at Montgomery; West Gulf States, 15° at New Orleans to 33° at Corsicana; Ohio Valley and Tennessee, 22° at Cairo to 32° at Knoxville; Lower Lake region, 21° at Erie to 30° at Rochester; Upper Lake region, 24° at Grand Haven to 30° at Alpena and Port Huron; Upper Mississippi valley, 23° at Davenport to 34° at St. Paul; Valley of the Red River of the North, 37° at St. Vincent to 43° at Breckenridge; Lower Missouri valley, 26° at Omaha to 40° at Yankton and 41° at Bismarck; Rio Grand valley, 22° at Brownsville to 31° at Stockton and 32° at Rio Grand City; Texas, 28° at Fort McKavett to 32° at Uvalde and 38° at Pilot Point; Rocky Mountain region, 25° at Pike's Peak to 42° at Denver; Western Plateau district, 33° at Salt Lake City to 54° at Winnemucca; Southern Plateau district, 33° at Tucson to 45° at Wickenburg; California, 23° at San Francisco to 39° at Los Angeles and 40° at Visalia; Oregon, 28° at Portland to 43° at Dayton.

Frost.—The dates of first frosts are shown below. General and killing frosts have not been reported extensively. They first occurred at scattered stations in the various States as follows: Iowa and Wisconsin, 8th and 9th; Nebraska, 13th; Maine, Massachusetts, New Hampshire and Pennsylvania, 24th; Michigan, New York and Ohio, 30th. *Connecticut*: Southington, 30th. *Georgia*: Gainesville, 30th. *Illinois*: General in northern half of State on 4th and 5th, and throughout State from the 27th to the 30th. *Indiana*: New Corydon, 14th, 15th, 30th; Vevay, 14th, 29th, 30th; Wabash, 10th, 14th, 15th, 22nd, 23rd. *Iowa*: General between the 8th and 10th, 13th, 14th and 26th to 30th; Kansas: Holton, Lawrence and Yates Centre, between 9th and 13th, and 27th to 29th; Topeka and Wallington, 27th. *Maine*: Cornish, 23rd, 24th; Gardiner, 24th. *Maryland*: Deer Park, 10th, 14th, 15th, 29th, 30th. *Massachusetts*: Springfield, 11th; Fall River, Mendon, Rowe, Springfield, Westborough, Williamstown and Milton, 23rd and 24th; Milton and Westborough, 30th. *Michigan*: Niles, 9th, 19th; Kalamazoo and Litchfield, 14th; Marquette, 8th; general, 22nd to 30th. *Missouri*: Ashland and Oregon, 9th, 13th or 14th and between 27th and 30th. *Montana*: Virginia City, 1st. *Nebraska*: All stations, 13th, 20th, 29th. *New Hampshire*: General, 23rd, 24th, 30th. *New Jersey*: Phillipsburg, 11th, 15th, 23rd, 24th, 29th, 30th. *New York*: Waterburgh, 11th; Palermo, 15th; Flushing, Palermo and Waterburgh, 24th; Dundee and White Plains, 30th. *North Carolina*: Highlands and Murphy, 10th; Franklin, 30th. *Ohio*: Bellefontaine and North Lewisburg, 10th; Bethel, College Hill and Norwalk, 14th or 15th; general on the 30th. *Pennsylvania*: Dyberry, 11th, 12th; Catawissa, 15th; frequent in State, 23rd, 24th, 29th, 30th; near Philadelphia, 15th. *Tennessee*: Ashwood, 14th, 30th; McMinnville, 30th. *Utah*: Coalville, 1st, 12th, 25th, 26th; Utah, 12th and from 19th. *Vermont*: Lunenburg and Windsor, 24th. *Virginia*: Wytheville, 15th, 29th. *West Virginia*: Flemmington, 30th. *Wisconsin*: Frequent in northern part of State from 8th to 10th, 13th to 15th; general from 27th to 30th. *Wyoming*: Cheyenne, 12th.

Ice.—*Idaho*: Boise City, 25th, 26th, $\frac{1}{2}$ inch thick. *Iowa*: Fort Madison, 9th; Cresco, 8th. *Michigan*: Hudson, 24th, $\frac{1}{2}$ inch; Lansing, 29th. *Minnesota*: St. Vincent, 7th. *Missouri*: Forest City, 27th, 29th. *Montana*: Ft. Custer, 20th. *Nebraska*: Austin, 13th, 29th. *New Hampshire*: Grafton, 23rd; Mt. Washington, 8th. *Nevada*: Winnemucca, 19th, 27th. *Utah*: Coalville, 1st, 25th, 26th; Deep Creek, 23rd, $\frac{1}{2}$ in. *Wisconsin*: Embarras and Bloomfield, 21st, 30th. *Wyoming*: Cheyenne, 12th.

PRECIPITATION.

The general distribution of rain-fall, for September, 1880, is shown on chart No. III, as accurately as possible, from about 500 reports. The table on this chart shows the *average* precipitation for September, as compared with that of the present month. The rainfall has been normal in New England, the Ohio, Lower Missouri, Upper Mississippi and St. Lawrence valleys. Elsewhere deficiencies have occurred, except in the Gulf States, from which latter districts, excesses ranging from 1.36 in the eastern to 4.24 inches in the western half, are reported. In central Texas, the rainfall was unusually large, causing local floods, which are elsewhere noticed. The rainfall was greatly deficient (over 3 inches) in Florida and the South Atlantic States. Less important deficiencies are noted in the Lake region, Upper Missouri valley, Minnesota and on the entire Pacific coast.

Special Heavy Rains.—1st, Vicksburg, 5.24 inches; Dover Mines, Va., 2.30 in. in 5 hours, 15 minutes; Portsmouth, N. C., 1.28 in. in 30 minutes. 2nd, Fayette, Miss., 2.60 in. in 13 hours, 25 minutes. 2nd and 3rd, Highlands, N. C., 5.58 in. 3rd, Fort Barrancas, Fla., 2.06; Ft. Davis, Tex., 2.19 in 1 hour, 9 minutes. 3rd and 4th, Galveston, Tex., 3.44 in. 4th, Fort Barrancas, Fla., 3.15 in. in 15 hours, 15 minutes; Fredericksburg, Tex., 2.01. 6th, Dover Mines, Va., 0.90 in. in 35 minutes. 7th, Shreveport, 2.11 in.; Pensacola, 3.70 in.; Fayette, Miss., 2.90 in. in 12 hours, 25 minutes; Indianola, Tex., 1.27 in. in 25 minutes. 9th, Portsmouth, N. C., 3.40 in.; Daytona, Fla., 2.98 in. in 4 hours; Ft. Davis, Tex., 2.42 in. in 45 minutes. 10th, Mt. Washington, 2.33 in.; Mayport, 2.10 in. in 11 hours, 15 minutes; Thatcher's Island, Mass., 2.78 in. 12th, Shreveport, 2.84 in. 13th, Eagle Pass, 3.50 in. in 12 hours. 13th and 14th, Ft. Davis, Tex., 2.77 in., of which 2.30 in. fell in 15 hours. 15th, Mt. Washington, 7.41 in.; Fredericksburg, Tex., 2.62 in. 18th, Neillsville, Wis., 3.90 in. in 11 hours, 10 minutes. 18th and 19th, Clinton, Ia., 3.15 in. in 33 hours. 19th, Muscatine, Ia., 0.16 in.

in 6 minutes. 20th, Coleman, Tex., 2.47 in.; Denison, Tex., 3.59 in.; Pilot Point, 5.29 in.; Decatur, Tex., 2.35 in.; Jacksboro, Tex., 3.00 in. in 11 hours; Concho, 2.10 in. in 9 hours, 35 minutes. 21st, Decatur, 2.23 in.; Silver City, 2.80 in.; Jacksboro, Tex., 3.17 in. in 12 hours. 22nd, Fredericksburg, Tex., 3.13 in.; Jacksboro, Tex., 1.95 in. in 1 hour, 15 minutes. 24th, Atlanta, 3.17 in.; Highlands, N. C., 2.10 in. in 10 hours; McPherson Barracks, Ga., 3.00 in. 24th and 25th, Fort Barrancas, Fla., 2.15 in. in 24 hours, 30 minutes. 25th, Monticello, Ia., 5.00 in. Dubuque, 3.38 in.; Des Moines, 2.92 in.; Pensacola, 3.68 in. 26th, Denison, Tex., 2.52 in. 27th, Indianola, 2.35 in.; Mt. Washington, 2.41 in.; Pembroke, Can., 4.39 in. 29th, Little Mountain, O., 2.00 in. in 17 hours.

Largest Monthly Rain-falls.—Ellsworth, N. C., 15.50 inches; Mt. Washington, N. H., 15.23; Stockton, Tex., 13.30; Jacksboro, Tex., 13.95; Ft. Barrancas, Fla., 12.80; Highlands, N. C., 12.66; Fredericksburg, Tex., 12.25; Shreveport, La., 11.61; Pensacola, Fla., 11.51; Fayette, Miss., 11.20; Vicksburg, Miss., 10.51; Mason, Tex., 10.39; Galveston, Tex., 10.20; Monticello, Ia., 9.32; Decatur, Tex., 9.13; Gainesville, Ga., 8.95; Indianola, Tex., 8.21.

Smallest Monthly Rain-falls.—In California, Nevada and Utah no rain fell except at stations here mentioned. Yuma, A. T. Coalville, Utah, Helena, M. T., Ft. Meade, D. T., Ft. Washakie, Wyo., and Princeton, Cal., trace; Campo and Cisco, Cal., 0.01; Ft. Shaw, M. T., Ft. Bidwell, Cal. and Ft. McDermitt, Nev., 0.05; Ft. Keogh, M. T., 0.07; Terrace, Nev. and Kelton, Utah, 0.08; Ft. Niobrara, Neb. and Boise City, Idaho, 0.11; Virginia City, M. T., 0.15; Pioche, Nev. and Umatilla, Or., 0.18; Ft. Verde, A. T. and Dayton, Wash. T., 0.19; Ft. Randall, D. T., Lewiston, I. T. and Ft. Custer, M. T., 0.20; Hermosa, Col., 0.21; Corinne, Utah, 0.25; Deadwood, Dak., 0.30; Dodge City, Kan. and Ft. Benton, M. T., 0.32; Ogden, Utah and Ft. McDowell, A. T., 0.34; Ft. Assiniboine, M. T. 0.37; Roseburg, Or., 0.47, Yates Centre, Kan., 0.51; Salt Lake City, Utah, 0.56; Camp Douglas, Utah, 0.84.

Rainy Days.—The number of days on which rain or snow has fallen, varies as follows: New England, 6 to 17; Middle Atlantic States, 5 to 11; South Atlantic States, 5 to 13; Eastern Gulf States, 5 to 19; Western Gulf States, 11 to 17; Ohio valley and Tennessee, 10 to 17; Lower Lake region, 8 to 16; Upper Lake region, 11 to 18; Upper Mississippi valley, 5 to 10; Missouri valley, 6 to 10; Red River of the North valley, 7 to 13; Texas, 3 to 17; Rocky Mountains, 2 to 11; Middle Plateau, 0 to 5; California, 0; Oregon, 3 to 8.

Cloudy Days.—The number varies in New England from 4 to 14; Middle Atlantic States, 5 to 10; South Atlantic States, 6 to 12; Eastern Gulf States, 2 to 13; Western Gulf States, 9 to 13; Ohio valley and Tennessee, 6 to 16; Lower Lake region, 7 to 10; Upper Lake region, 6 to 13; Upper Mississippi valley, 4 to 6; Missouri valley, 5 to 7; Red River of the North valley, 5 to 8; Texas 0 to 13; Rocky Mountains, 0 to 6; Middle Plateau, 0 to 2; California, 0 to 9; Oregon, 2 to 6.

Hail.—*Colorado*: Pike's Peak, 1st, 6th, 8th to 10th, 18th, 21st. Summit, frequent. *Iowa*: Davenport, 19th; some stones over one-half inch in diameter, half ice, very irregular shape, with numerous conical projections; some had cavities in centre; Mount Vernon, 15th; Ames and Yates Centre, 25th; *Kansas*: Leavenworth, 25th. *Michigan*: Kalamazoo, 29th; Marquette, 28th. *New York*: Waterburgh, 6th, 28th; Dundee, Buffalo, Oswego and Rochester, 29th; North Volney, 30th. *Ohio*: Cleveland, 28th, 29th, very large stones; Margaretta, 29th. *Minnesota*: At Euclid, 24th; very large hail, over a belt of country two miles wide; one stone weighed 12 ounces, and the diameter of the longer axis of another was 4 inches—men found it necessary to protect their heads. *Nebraska*: North Platte, 17th.

Snow.—*California*: Visalia, 24th, on mountains east of town. *Colorado*: Denver, 25th; Pike's Peak, 2d, 9th, 20th, 21st, 25th, 26th; Colorado Springs, 26th; Fort Garland, (7th, Baldy and Sierra Blanca, covered with snow,) 26th. *New Hampshire*: Mt. Washington, 10th. *New York*: Rochester, 14th. *Michigan*: Fort Wayne, 29th. *Vermont*: Mt. Mansfield, 23d. *Wyoming*: Lookout Station, 25th.

Sleet.—*Michigan*: Marquette, 29th.

Floods.—General and heavy rains in western Texas, from the 13th to the 16th, caused unusually high water and did considerable damage, as is herein shown. Castroville, Tex., 15th, Medina river very high, crossing impracticable; ditto on the 27th. Concho, Tex., 19th, the Concho river rose 14 feet on the night of the 19th and 20th. Mason, Tex., 16th, the Comanche, a stream 3 miles east of this town, very high, destroying property and carrying off stock: never known to overflow before. Uvalde, Tex., 15th, Frio river very deep and out of its banks; river higher than ever known before; couriers sent to warn people of the town of danger. 17th, many houses, outbuildings and grain-stacks carried away. In Frio town water 3 to 4 feet deep in court-house, some horses, cattle and many hundred sheep drowned. At Sabinal, one man drowned. Silver City, N. M., 21st, damaging buildings, etc., one boy and some stock drowned. Muscatine, Ia., 27th, Cedar creek said to have risen 12 feet in 26 hours. Neillsville, Wis., 19th, very heavy rains, raised creek and flooded part of town.

Droughts.—The droughts reported from New England, undoubtedly result from the great deficiency in rain-fall of nearly 6.00 inches, from March 1st to June 30th, of this year. The rain-fall from July 1st to October 1st, has been slightly above the normal in that section of the country.

Bangor, Maine, to 9th; great suffering in farming districts; streams drying up; stock driven long distances for water; many mills stopped. Charlotte, Vt., severe to the 13th. Windsor, Vt., severe at beginning of month up to 9th. Woodstock, Vt., 28th, drought of July and August still prevails; many wells and streams dry; farmers compelled in early part of month to haul water for stock. Westborough, Mass., month warm and dry. Auburn, N. H., drought severe in early part of month. Fort Madison, Iowa, 30th, water scarce, some wells dry. Sandy Springs, Md., 30th, slight drought.

Rain-fall During August, Received Too Late to be Used in August Review.—*Arizona*: Ft. Apache, 1.44 Signal Service and 2.02 Medical department, U. S. A.; Fort Bowie, 0.97; Fort Lowell, 3.64; Fort McDowell, 0.84; Fort Mojave, 1.80; Camp Thomas, 2.49; Whipple Barracks, 3.76. *California*: Angel Island, Alcatraz, Venicia Barracks, Fort Gaston, Fort San Jose, Presidio, S. F., Oakland and Ventura, none; Poway, 0.16; Oakwood Ranch, 0.26; Fort Bidwell, 0.42. *Colorado*: Fort Collins, 0.37; Fort Garland, 1.52; Fort Lyon, 4.92. *Dakota*: Fort Hale, 5.46; Fort A. Lincoln, 5.63; Fort Mead, 3.91, Fort Randall, 3.80; Fort Sisseton, 3.88; Fort Stevenson, 4.63; Fort Sully, 5.26. Fort Totten, 5.80; Ollivet, 5.62. *Florida*: St. Augustine, 8.20; of this 6.20 fell 28th to 31st. *Idaho*: Fort Hall, 1.50; Fort Lapwai, 0.80; Lewiston, 1.09. *Michigan*: Fort Brady, 3.63. *Montana*: Fort Assineboine, 2.56 Signal Service, and 2.36 Medical department, U. S. A.; Fort Ellis, 0.34; Fort Logan, 0.82. *Nebraska*: Fort Niobrara, 1.82. *Nevada*: Fort McDermitt, 0.30. *New Mexico*: Fort Union, 6.56; Fort Wingate, 1.49. *Oregon*: Fort Klamath, 0.08; Fort Stevens, 0.60. *Texas*: Fort Davis, 5.66 (S. S.); 3.88 (M. D.); *Utah*: Fort Douglas, 0.74. *Washington Territory*: Bainbridge Island, 1.30; Fort Canby, 0.78; Fort Townsend, 0.54; Neah bay, 1.06. *Wyoming Territory*: Fort Fetterman, 2.09; Fort Washakie, 0.76.

RELATIVE HUMIDITY.

The percentage of mean relative humidity for the month ranges as follows: New England, from 71 to 81; Middle Atlantic States, 66 to 87; South Atlantic States, 69 to 88; Eastern Gulf States, 71 to 80; Western Gulf States, 70 to 81; Ohio valley and Tennessee, 62 to 77; Lower Lake region, 65 to 73; Upper Lake region, 65 to 75; Upper Mississippi valley, 62 to 71; Missouri valley, 60 to 67; Red River of the North valley, 70 to 76; Texas, 67 to 81; Middle Plateau, 19 to 39; California, 37 to 79; Oregon, 64 to 78. *High stations* report the following percentages not corrected for altitude: Mt. Washington, 86.6; Denver, 43.9; Virginia City, 31.0; Cheyenne, 38.6.

WINDS.

The prevailing directions of the wind during September, 1880, are shown by arrows, flying with the wind, on Chart No. II. The prevailing direction in New England, the Lake region, the Ohio and Upper Mississippi valleys was *southeasterly*; in Florida, Tennessee, the South Atlantic and Eastern Gulf States, *northeasterly*; in the Western Gulf States, including all of Texas, *southeasterly*; the Upper Missouri and Red River valley of the North, *northwesterly*; the Lower Missouri valley and the Eastern Rocky Mountain Slope, *southerly*. On the Pacific coast it was *northwesterly*, except *south* at Sacramento and *southwest* at Los Angeles. In the Middle Atlantic States the winds were mostly from *northwest* to *southwest*. In the Plateau Districts they were *variable*. On Mt. Washington the prevailing direction was NW. and maximum velocity was S. 76 miles per hour on the 28th. Other maximum velocities of 50 miles or more occurred as follows: 10th, NE. 60; 15th, NE. 70; 21st, NW. 70; 22nd, NW. 60; 27th, NW. 57. The prevailing direction on Pike's Peak was SW.; the total monthly movement was 9,824 miles and maximum velocity 50 miles W., 4th. A maximum velocity of 50 miles NE. was reported from Cape Henry on the 9th.

Total Movements of the Air:—The following are the *largest* total movements in the various districts: Mt. Washington, (summit of,) frost work prevented complete record; Cape Lookout, 10,142; Thatcher's Island, 9,749; Pikes Peak, 9,824; Cape May, 9,704; North Platte, 9,585; Sandusky, 9,316; Bismarek, 8,238; Indianola, 8,190; Milwaukee, 8,012; San Francisco, 7,577; St. Louis, 6,575; Winnemucca, 5,853. The *smallest* are La Mesilla, 615; Silver City, 1,707; Lynchburg, 1,862; Uvalde, 1,896; Augusta, 1,948; Roseburg, 2,159; Visalia, 2,266; Shreveport, 2,651; Yuma, 2,904; Boise City, 2,925; Nashville, 2,930.

Local Storm.—On Friday, the 3rd, a tornado passed through the south part of Riley, Ill. It came from the southwest and moved to the northeast in a path about 200 feet wide. An observer says: It turned a tree, two feet in diameter, up by the roots, and twisted off two others, of two feet diameter, about twelve feet from the ground and carried the sundered parts eight or ten rods, and scattered them in pieces over a large surface. It broke off a sound hard maple of thirty years growth, over a foot in diameter, ten feet from the ground, and took off several feet of the tops of stacks of oats and scattered the bundles. It all occurred within five minutes and in the meantime water came down in torrents with a whirling motion. There was considerable damage done in Harmony and elsewhere south of Riley by the same storm, but no houses blown away.

Waterspouts.—Key West, Fla., 16th, 3 p. m., about six miles distant. Buffalo, 29th, 4 waterspouts reported to have been seen on Lake Erie, 4 miles from this city, moving from SW. to NE. They were said to be cylindrical rather than conical.

Sand Storms.—Umatilla, Or., 22nd; Burkes, A. T., 9th and 12th.